Amendments to the Claims

Please amend Claims 1-4, 6-13, 15, 19, 20, 21, and 23-32. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently amended) A variable-impedance active ankle foot orthosis comprising a device for modulating an impedance of an ~~orthotic~~ ankle joint throughout a walking cycle for treating an ankle foot gait pathology.

2. (Currently amended) The device of Claim 1, wherein the device includes an actuator that modulates the impedance of the ~~orthotic~~ ankle joint by controlling stiffness to achieve a torsional spring control.

3. (Currently amended) The device of Claim 1, wherein the device includes an actuator that modulates the impedance of the ~~orthotic~~ ankle joint by controlling ~~at least one of a spring~~ joint stiffness, or a ~~spring~~ damping, or both to achieve a spring-damper positional control.

4. (Currently amended) The device of Claim 1, wherein the device includes an actuator that is coupled to a foot portion of [[the]] an orthosis.

5. (Previously Presented) The device of Claim 1, wherein the device includes an actuator that is a series elastic actuator.

6. (Currently amended) The device of Claim 1, ~~wherein the~~ further comprising an orthosis ~~includes~~ with an ankle angle sensor.

7. (Currently amended) The device of Claim 1, ~~wherein the~~ further comprising an orthosis includes one or more ground reaction force sensors.

8. (Currently amended) The device of Claim 1, ~~wherein the~~ further comprising an orthosis ~~includes~~ with an actuator, an ankle angle sensor, one or more ground reaction force sensors, and a controller for controlling the orthosis.

9. (Currently amended) The device of Claim 1, ~~wherein the~~ further comprising an orthosis ~~includes~~ with a foot switch.

10. (Currently amended) The device of Claim 1, ~~wherein the~~ further comprising an orthosis [[is]]being used to treat drop foot gait.

11. (Currently amended) The device of Claim 1, ~~wherein the~~ further comprising an orthosis [[is]] being used to treat a patient having anterior muscle weakness, posterior muscle weakness, or a combination thereof.

12. (Currently amended) A device for treating an ankle foot gait pathology comprising:

an orthosis including an orthosis leg portion attachable to a leg of a person and an orthosis foot portion attachable to a foot of the person~~, the orthosis leg portion and the orthosis foot portion defining an orthotic joint~~; and

an actuator configured to act on a spring to modulate an impedance of the ~~orthotic~~ ankle joint throughout a walking cycle.

13. (Currently amended) The device of Claim 12, wherein the actuator adjusts stiffness of the ~~orthotic~~ ankle joint by controlling the spring deflection during controlled plantar flexion to minimize forefoot collisions with the ground.

14. (Original) The device of Claim 12, wherein the actuator minimizes the impedance during late stance.

15. (Currently amended) The device of Claim 12, wherein the actuator modulates the impedance of the ~~orthotic~~ ankle joint by controlling joint ~~at least one of a spring~~ stiffness or ~~a spring~~ damping, or both to achieve a spring-damper control during a swing phase.

16. (Original) The device of Claim 12, further comprising an ankle angle sensor.

17. (Original) The device of Claim 12, further comprising one or more ground reaction force sensors.

18. (Original) The device of Claim 12, further comprising a controller for controlling the orthosis.

19. (Currently amended) A method comprising modulating an impedance of an ~~orthotic~~ ankle joint ~~of an orthosis~~ throughout a walking cycle.

20. (Currently amended) The method of Claim 19, wherein the step of modulating the impedance of the ~~orthotic~~ ankle joint throughout the walking cycle further includes adjusting the stiffness of the ~~orthotic~~ ankle joint during controlled plantar flexion to minimize forefoot collisions with the ground.

21. (Currently amended) The method of Claim 20, wherein the stiffness of the ~~orthotic~~ ankle joint is adjusted to achieve a torsional spring control.

22. (Original) The method of Claim 19, further comprising minimizing the impedance during late stance.

23. (Currently amended) The method of Claim 19, wherein the step of modulating the impedance of the ~~orthotic~~ ankle joint throughout the walking cycle further comprises modulating ~~at least one of spring~~ ankle joint stiffness, or ~~spring~~ damping, or both of a torsional spring-damper control during a swing phase.

24. (Currently amended) A method of treating an ankle foot gait pathology using functional electrical stimulation, comprising applying electrical pulses to elicit muscle contractions to actively modulate ankle stiffness to achieve a torsional spring control during ~~controlled~~

~~plantar flexion so as to minimize forefoot collisions with the ground~~ a stance period, and to actively modulate at least one of ~~spring~~ joint stiffness, ~~spring~~ damping or both ~~to achieve a torsional spring-damper control during a swing phase~~.

25. (Currently amended) A variable-impedance active ankle foot orthosis comprising:

an actuator and a spring operatively linked to the actuator, the actuator modulating an impedance of an ~~orthotic~~ ankle joint by controlling a spring compression in response to at least two sensed parameters throughout a walking cycle, the actuator modulating the impedance of the ~~orthotic~~ ankle joint by controlling the spring in at least three different modulation phases of the walking cycle in response to [[the]] at least two sensed parameters.

26. (Currently amended) The variable-impedance active ankle foot orthosis of Claim 1, wherein the device further includes a spring linked to an actuator, wherein the actuator modulates the impedance of an ~~orthotic~~ ankle joint by controlling the spring.

27. (Currently amended) The variable-impedance active ankle foot orthosis of Claim 26, wherein the actuator modulates the impedance of the ~~orthotic~~ ankle joint by controlling stiffness of a torsional spring control.

28. (Currently amended) The variable-impedance active ankle foot orthosis of Claim 27, wherein the actuator modulates the impedance of the ~~orthotic~~ ankle joint by controlling ~~at least one of~~ a ~~spring~~ joint stiffness, ~~a spring~~ damping or both of a torsional spring-damper control.

29. (Currently amended) The method of Claim 19, further including the steps of operatively coupling a spring to ~~the orthotic joint of the~~ an orthosis, and sensing one or more parameters of the ~~orthotic joint~~ orthosis throughout the walking cycle.

30. (Currently amended) The method of Claim 29, wherein the impedance of the ~~orthotic joint of the orthosis~~ ankle joint is modulated by controlling the spring in response to the sensed parameters.

31. (Currently amended) A method of treating an ankle foot gait pathology using functional electrical stimulation, comprising:

applying electrical pulses to elicit muscle contractions to actively modulate ankle stiffness to achieve a torsional spring control during a stance period, and to actively modulate at least one of joint stiffness, damping or both to achieve a torsional spring-damper control during a swing phase, ~~The method of Claim 24, wherein~~ the impedance [[is]] further being modulated by controlling a spring operatively connected to an orthosis ~~orthotic joint~~.

32. (Currently amended) The method of Claim 19, further including the steps of operatively receiving a parameter of a forefoot force signal throughout the walking cycle and modulating the impedance of the ~~orthotic~~ ankle joint in response to the parameter.